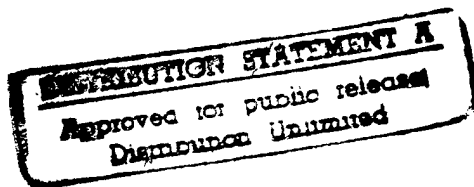


Basewide Energy Systems Plan for Fort McPherson



Volume I Executive Summary

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November 1981

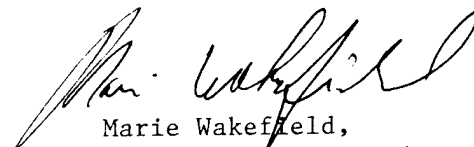


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BASEWIDE ENERGY SYSTEMS PLAN
FOR
FORT MCPHERSON, GEORGIA

FINAL REPORT
ADDRESSING INCREMENTS A, B, AND G
VOLUME I - EXECUTIVE SUMMARY

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ARMY CONTRACT NO. DACA21-80-C-0014
JRB CONTRACT NO. 2-815-04-225

NOVEMBER 1981

EXECUTIVE SUMMARY

This report presents the results of Increments A, B, and G of the Energy Engineering Analysis Survey conducted at Fort McPherson in Atlanta, Georgia, by JRB Associates under Contract No. DACA21-80-C-0014. The report includes analyses of the energy patterns at the Post, and the identification and evaluation of energy conservation opportunities. The results obtained indicate that energy use at Fort McPherson can potentially be reduced by 28 percent by FY 1985, compared to the FY 1975 energy use.

Initial data for the study were gathered through a series of site visits during which buildings were inventoried, patterns of building energy use were identified, and typical buildings were selected for detailed study in each category. The energy use data were analyzed to determine how much energy the various types of buildings use and the functional energy use. Figures 1, 2, and 3 provide a summary of the building inventory and energy use.

Fuel oil, natural gas, and electricity are the main energy sources at Fort McPherson. A summary of FY 1979 basewide energy use by fuel type is given in Figure 4, which shows that electricity accounts for approximately 56 percent of total energy use. Total energy use at the Base for the last 3 years is shown in Table 1.

A detailed study was performed of the usage of all energy sources, including an analysis of monthly consumption figures. Peak demands for both fuel oil and natural gas occurred in the winter months due to space heating requirements. The electrical peak demand was in the summer months to satisfy air conditioning requirements. The end-uses of fuel oil and natural gas are shown in Figure 5, while the end-uses of electricity are shown in Figure 6. Table 2 shows the current energy use at Fort McPherson by building category and system.

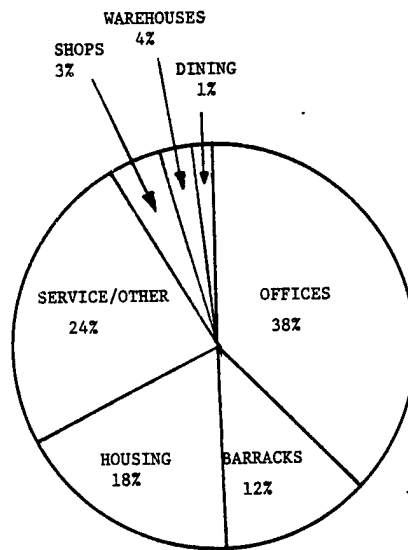


FIGURE 1. FY 1979 BUILDING AREA PROFILE BY CATEGORY

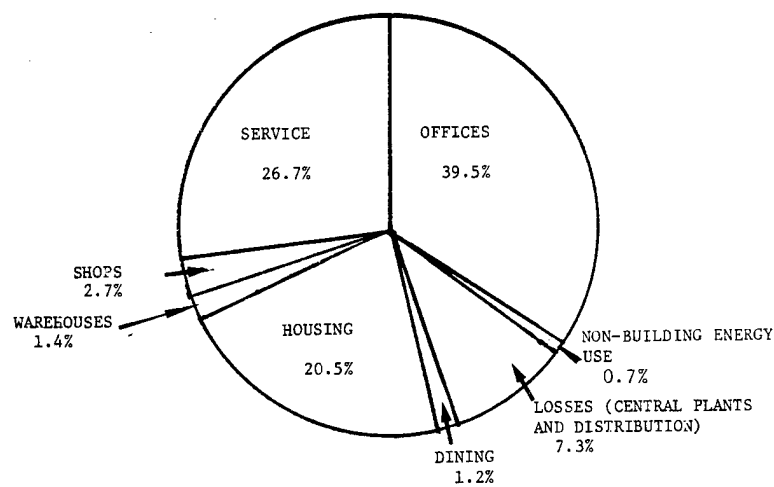


FIGURE 2. FY 1979 ENERGY USE BY BUILDING CATEGORY

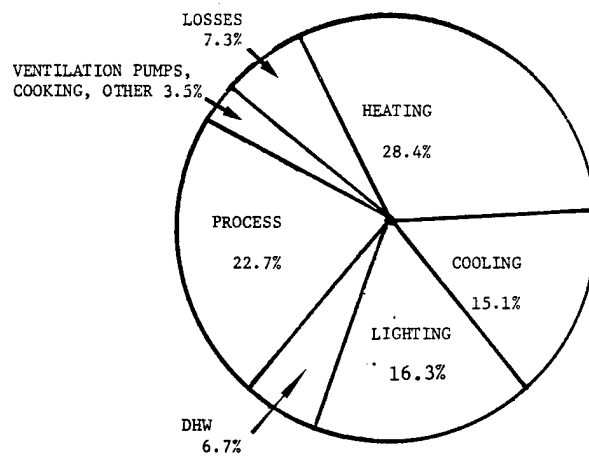


FIGURE 3. FY 1979 ENERGY USE BY BUILDING SYSTEM

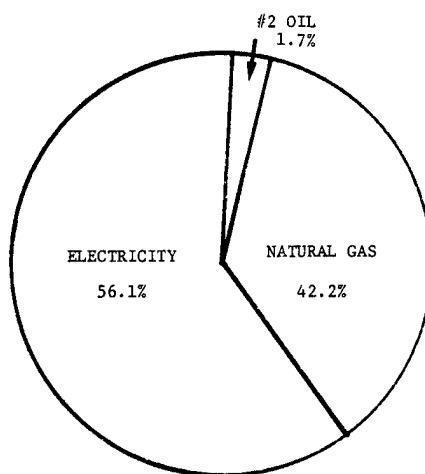


FIGURE 4. FY 1979 ACTUAL ENERGY USE

TABLE 1. FUEL USE: FY 1977-1979 (Btu x 10⁹)

	FY 1977	% of Total	FY 1978	% of Total	FY 1979	% of Total
No. 2 Fuel Oil	38.3	8.6	23.8	5.9	6.4	1.7
Electricity	231.6	52.	216.5	53.5	207.0	56.1
Natural Gas	175.5	39.4	164.4	40.6	155.5	42.2
TOTAL	445.4	100	404.7	100	368.9	100

SOURCE: FY 1977, 1978 — Fort McPherson Facilities Engineering Directorate
FY 1979 — See Table 3-3

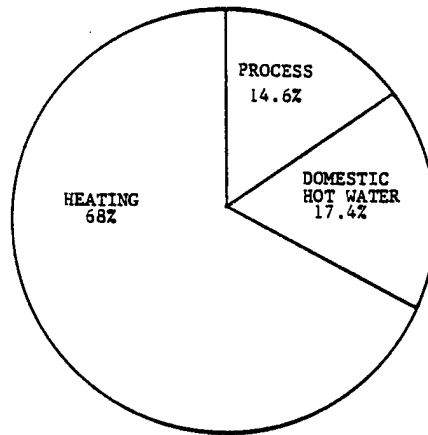


FIGURE 5. FY 1979 NATURAL GAS AND FUEL OIL USE BY SYSTEM TYPE

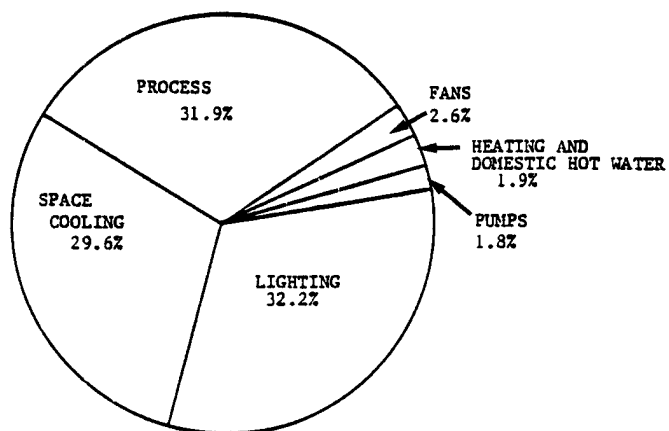


FIGURE 6. FY 1979 ELECTRICAL ENERGY USE BY BUILDING SYSTEM

The energy conservation opportunities at Fort McPherson are summarized in Table 3 which shows all the projects evaluated and the resulting economic indices. A more detailed discussion of the existing and proposed EMCS conditions is presented in Volume III, Section 3. This section presents the existing conditions and proposed alterations evaluated to meet ECIP criteria. The projects that have already been implemented or programmed are discussed in Section 5 of the Volume II report. The energy conservation opportunities developed by JRB were analyzed for their applicability to typical buildings and for their economic viability. Field surveys were used to develop additional verification for the selected projects. The economic indices of the recommended ECIP and Increment G projects are shown in Table 4. A discussion of each project is presented in Section 5 of the Volume II report and in Section 4 of the Volume III report. Table 5 presents a summary of the impact that the current and recommended energy conservation projects will have on Fort McPherson's energy use.

TABLE 3. EVALUATED PROJECTS -- FORT MCPHERSON

PROJECT DESCRIPTION	ECONOMICS INDICES			ENERGY SAVINGS (MMTU/YR)				CME (\$)	Annual Savings (\$)
	E/C	B/C	Payback (Yrs.)	Category	Fuel Oil	Nat. Gas	Elec.		
<u>Building Shell</u>									
Reduce Window Openings	5.4	0.5	--	X					
Storm Windows*	13.04	1.5	12.03	ECIP #2		5,977.8	--	458,173.00	38,078.50
Wall Insulation	19.8	2.3	7.92	ECIP #1		5,013.0	--	252,941.47	31,932.81
Ceiling Insulation*	18.8	2.2	8.35	ECIP #3		9,610.0	--	511,097.09	61,215.70
Loading Dock Door Seals	No Applications								
Reduce Solar Heat Gain	<3	<0.5		X					
Vestibules	1.0	0.2		X					
Storm Doors	8.2	0.9		X					
Reduce Door Size	No Applications								
Replace Doors	1.2	0.8		X					
Enclose Loading Dock (Curtains) (Strips)	No Applications No Applications								
X Does Not meet economic criteria * Also in Family Housing ECIP									

TABLE 3. EVALUATED PROJECTS — FORT MCPHERSON
(Continued)

PROJECT DESCRIPTION	ECONOMICS INDICES			Category	ENERGY SAVINGS (MBTU/YR)			CWE (\$)	Annual Savings (\$)
	E/C	B/C	Payback (Yrs.)		Fuel Oil	Nat. Gas	Elec.		
<u>Lighting</u>									
Replace Incandescent Lighting: Bldg. 500	68.3	6.8	2.69	ECIP #6	--	--	678.11	9,927.00	3,689
Replace Incandescent Lighting: Misc. Bldgs.	62.3	5.6	2.2	O&M	--	--	3,981.91	63,885.00	29,065
Replace Incandescent Lighting: Bldg. 363	20.0	2.2	9.19	ECIP #6	--	--	390.05	19,500.00	2,122
Reduce Height of Luminaires	No Applications								
Add Switching	No Applications								
Add Controls to Shut Lamps Off	No Applications								
Use Automatic Dimming Controls	2.8	.3	67.17	X					
Site Lighting	33.1	3.6	5.51	ECIP #6	--	--	1,007.7	30,482.00	5,482
Exit Lighting	4.2	.4	43.97	X					
X Does not meet economic criteria									

TABLE 3. EVALUATED PROJECTS — FORT MCPHERSON
(Continued)

PROJECT DESCRIPTION	ECONOMICS INDICES			ENERGY SAVINGS (MBTU/YR)				CWE (\$)	Annual Savings (\$)
	E/C	B/C	Payback (Yrs.)	Category	Fuel Oil	Nat. Gas	Elec.		
Building Heating & Cooling Eliminate Unnecessary Roof Vents	No Applications								
Recirculate Exhaust Air Through Charcoal	6.9	.6		X					
Reduce Air Flow Rates	109.6	7.7	1.56	ECIP #6		354.56	476.56	7,581	4,581
Shut Down Ventilation Systems	No Applications								
Heat Wheels for Recovery	No Applications								
Temperature Setback* (Offices)	(See ECIP #5, EMCS)								
Warm-Up Cycle Controls	2.8	.3		X					
Automatic Control Valves for Radiators	No Applications								
Rezone Heating System	No Applications								
Replace Gas Pilots with Spark Ignition*	35.3	2.6	4.88	ECIP #6	--	994.80	--	28,166	5,771
Recover Heat (Laundry)	10.4	1.3	15.07	ECIP #6	--	550		52,782	3,504
Economizer Controls	2.5	.2		X					
X Does not meet ECIP economic criteria * Also in Family Housing ECIP									

TABLE 3. EVALUATED PROJECTS - FORT MCPHERSON
(Continued)

PROJECT DESCRIPTION	ECONOMICS INDICES			ENERGY SAVINGS (MBTU/YR)			CME (\$)	Annual Savings (\$)
	E/C	B/C	Payback (Yrs.)	Category	Fuel Oil	Nat. Gas Elec.		
<u>Building Heating & Cooling</u> (continued)								
Control Hot & Cold Deck	No Applications							
VAV Systems	No Applications							
Shut Down Air Conditioning Systems	No Applications							
Spot Cooling	No Applications							
Deadband Thermostats	No Applications							
Outside Air Reset Controls	No Applications							
Attic Ventilation	No Applications							
Heat Pumps	1.4	.1		X				
Air Stratification	14.2	1.8	10.81	ECIP #6	--	495 (62)	30,431	2,816
<u>Domestic Hot Water</u>								
Use Local Hot Water Heaters	No Applications							
Use Solar Heating	10.1	.8	--	X				
X Does not meet economic criteria								

TABLE 3. EVALUATED PROJECTS — FORT MCPHERSON
(Continued)

PROJECT DESCRIPTION	ECONOMICS INDICES			ENERGY SAVINGS (MBTU/YR)				CWE (\$)	Annual Savings (\$)
	E/C	B/C	Payback (Yrs.)	Category	Fuel Oil	Nat. Gas	Elec.		
<u>Domestic Hot Water (continued)</u>									
Desuperheaters									
• Barracks	40.5	4.7	4.2	ECIP #6	-	355.17	-	8,770	2,090
• Food Service	15.3	1.6	14.37	ECIP #6	-	263.5	-	17,254	1,201
<u>Insulate Hot Water Tanks:</u>									
• Family Housing	5.9	.7	26.50	X					
• Other Buildings	5.6	.7	28.55	X					
<u>Miscellaneous</u>									
Use Variable Speed Pumps	No Applications								
Motor Generator Sets	No Applications								
<u>Family Housing</u>	19.1	2.0	8.2	ECIP #4	-	7,617.74	-	398,222.	48,455
• Ceiling Insulation									
• Storm Windows									
• Night Setback Thermostats									
• Spark Ignition									
• Flue Gas Dampers									
X Does not meet economic criteria									

TABLE 3. EVALUATED PROJECTS - FORT MCPHERSON
(Continued)

Central Heating/ Cooling Plants	ECONOMICS INDICES			ENERGY SAVINGS (MBTU/YR)				CWE (\$)	Annual Savings (\$)
	E/C	B/C	Payback (Yrs.)	Category	Fuel Oil	Nat. Gas	Elec.		
Flue Gas Analyzer	9.2	0.9.	25	X					
Boiler Economizer	N/A								
Boiler Water Treatment	N/A								
Variable Speed Chiller Motor	N/A								
Reset Chilled Water Chiller Economizer	N/A								
Return Condensate	N/A								
Insulate Pipes (See O&M, Section 4-6)	N/A								
Add Flue Dampers	N/A								
Automatic Condenser Cleaning	1.2	.02	160	X					
Refuse Derived Fuels	N/A*								
EMCS	27.4	1.8	6.35	ECIP		607.7	4043.2	4650.9	26,714
* OPTION EVALUATED ONLY FOR CONVERSION OF EXISTING BOILERS AND NOT FOR THE INSTALLATION OF A CENTRAL REFUSE BURNING FACILITY.									

TABLE 4. ECIP AND INCREMENT G PROJECTS FOR BUILDINGS

PROJECT DESCRIPTION	ECONOMIC INDICES			ENERGY SAVINGS (MBtu/Yr)			CWE (\$)	ANNUAL SAVINGS (\$)
	E/C	B/C	PAY-BACK (YRS)	NATURAL GAS & OR OIL	ELEC.	TOTAL		
1. Wall Insulation	19.8	2.4	7.9	5,013	--	5,013	252,941	31,933
2. Energy Conservation Improvements for Family Housing:								
• Roof Insulation								
• Storm Windows								
• Night Setback Thermostats								
• Spark Ignitors	19.1	2.0	8.2	7,618	--	7,618	398,221	48,455
• Flue Gas Dampers								
3. Ceiling Insulation	18.8	2.3	8.4	9,610	--	9,610	511,097	61,216
4. Storm Windows	13.0	1.6	12.0	5,978	--	5,978	458,173	38,079
5. Energy Conservation Improvements for Various Buildings	27.3	2.7	6.4	3,013	2,490	5,503	201,848	31,526
TOTAL				31,232	2,490	33,722	1,822,280	211,209

INCREMENT G PROJECT:

Replace Incandescent Lamps with Fluorescent Lamps	74	6.6	1.8	--	3,981.91	3,981.91	53,723	29,065
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TABLE 5. CURRENT AND RECOMMENDED ENERGY CONSERVATION PROJECTS

ITEM	FUEL OIL ₆ Btu x 10 ⁶	NATURAL GAS Btu x 10 ⁶	ELECTRICITY Btu x 10 ⁶	TOTAL ₆ Btu x 10 ⁶
Site Energy Conservation Efforts				
• Through FY 1979	6,665	39,767.5	31,285.2	77,717.70
• Programmed	--	1,751.91	--	1,751.91
Increment A ECIP Projects	--	31,231.57	2,490.42	33,721.99
Increment C Projects Based on Increment A Criteria	--	--	3,981.91	3,981.91
Increment B ECIP Projects	--	607.71	4,043.2	4,650.91
Increment G Projects Based on Increment B Criteria	--	--	--	--
New Construction	--	--	--	--
Demolition	--	--	--	--
Reduced Function (Building 360)	--	1,225.35	2,589.88	3,815.23
TOTAL	6,665	74,584.04	44,390.61	125,639.65
FY 1975 Energy Use	13,100	195,270.9	238,252.40	446,623.30
Savings as Percent of FY 1975 Baseline	50.9%	38.2%	18.6%	28.1%